

REMARKS

Entry of this Amendment in supplement to the Amendment filed on February 27, 2004 is respectfully requested.

By the present Amendment, new claims 26 and 27 have been added to replace the previously cancelled claim 11. Also, page 23 of the specification has been amended to incorporate language from the original claim 11 with regard to Fig. 8 for clarification of the correlation between the claimed subject matter and the description in the specification. Since the original claim language is part of the original specification, this clarifying amendment to the specification is not new matter.

Reconsideration and removal of the objection to the drawings set forth on the bottom of page 2 of the September 16, 2003 Office Action as well as the 35 U.S.C. § 112, first paragraph, rejection set forth beginning on page 3 of the Office Action and the 35 U.S.C. § 112, second paragraph, rejection set forth on page 7 of the Office Action, with regard to the original claim 11, is respectfully requested to the extent that these objections and rejections pertain to the newly submitted claims 26 and 27. As mentioned above, the original claim 11 and the newly submitted claims 26 and 27 can be read on Fig. 8 and the specification beginning on page 23, line 5 describing Fig. 8. For purposes of explanation, marked copies of Figs. 5 and 8 are enclosed to assist the Examiner in better understanding the relationship between the claimed subject matter and Fig. 8.

Turning to the attached Sketches A and B, Sketch A shows an illustration of Fig. 5 marked with dashed lines to show that the arrangement of the emitter electrode 7 is such that all of the emitter electrodes 7 (commonly connected to

common emitter wirings 10 as discussed on page 18, line 7 et seq. of the specification) are arranged in a position to be over the thermal vias 4. In Sketch B, corresponding to Fig. 8, on the other hand, the emitter electrodes 7 located near the chip ends in the figure are arranged not to be disposed over the thermal vias 4 (as shown by the dashed lines in Sketch B).

Regarding this, the original language found on page 23, line 6 defines this relationship as follows:

“The embodiment shown in Fig. 8 is substantially the same as that shown in Fig. 5 but is constructed such that thermal vias 4 are not arranged only below emitter electrodes disposed nearest to ends (chip ends in the figure) of the semiconductor substrate 1.”

Similarly, on page 23, line 27 et seq., the structure shown in Fig. 8 is described as follows:

“To meet such need, an arrangement is preferable, in which thermal vias 4 are arranged immediately below those ones disposed centrally of emitters thus arranged, but not arranged immediately below the emitters in the peripheral portions.”

This difference between Figs. 5 and 8 can clearly be understood from the dashed lines shown on Sketches A and B. Specifically, in Sketch A, all of the emitter electrodes 7 are inside the dashed lines (and thus located over the thermal vias 4), whereas, in Sketch B, the emitter electrodes 7 at the peripheral portions are located outside the dashed lines (and thus not over the thermal vias 4).

As such, it is respectfully submitted that the structure defined in the original claim 11, and by the new claims 26 and 27, is clearly supported by Fig. 8 and the disclosure of this figure found on page 23 and 24. For example, new claim 26

defines that the emitter electrodes are disposed in a group over the semiconductor substrate:

“Wherein the emitter electrodes are disposed in a group electrically connected by a common emitter wiring located in a plane over the semiconductor substrate, wherein emitter electrodes in a central area of the group are located over areas which the through holes in the wiring board occupy, and wherein emitter electrodes disposed at both ends of the group are not located over the areas which the through holes in wiring board occupy.”

This also clearly reads on Fig. 8 and the disclosure found on page 24, lines 1-3.

The significance of this structural arrangement of Fig. 8 defined by newly submitted claims 26 and 27 is that it serves to reduce the large difference in temperature of the different emitter electrodes which exists in an arrangement such as shown in Fig. 5 between the emitter electrodes of the central area and the emitter electrodes of the peripheral areas. The problem with the large difference in temperature between emitters in the central portion and emitters in the peripheral portions is discussed on page 23, line 11 et seq. Such large differences in temperature can occur in an arrangement such as Fig. 5 because the heat influence on the emitter electrodes in the peripheral area is naturally reduced because these emitter electrodes do not have other electrodes on both sides of them (which the central emitter electrodes, of course, do). Therefore, in the structure of Fig. 5, the temperature of the central emitter electrodes can be much higher than that of the emitter electrodes at the peripheral area because the central electrodes are surrounded on both sides by other emitter electrodes which generate heat, whereas the peripheral emitter electrodes only have another emitter electrode on one side thereof. Accordingly, by not locating these peripheral emitter electrodes over the

thermal vias in the arrangement of Fig. 8, the temperature of the peripheral electrodes is much closer to that of the central emitter electrodes. In other words, the peripheral electrodes do not receive the cooling benefit of being over the thermal vias, so the thermal vias serve to reduce the temperature of the central emitter electrodes to be substantially the same as the temperatures of the peripheral emitter electrodes which do not need the benefit of the thermal vias. Thus, the undesirable oscillation caused by positive feedback described on page 23, lines 18-26, will not occur in the structure of Fig. 8. This represents a significant advantage over the arrangement of Fig. 5.

Accordingly, as discussed above, it is respectfully submitted that the newly presented claims 26 and 27 are clearly supported by the specification. In particular, as discussed above, these new claims 26 and 27 clearly comply with the enablement requirement of 35 U.S.C. § 112, first paragraph. Therefore, entry and allowance of these claims is earnestly solicited.

If the Examiner believes that there are any other points which may be clarified or otherwise disposed of either by telephone discussion or by personal interview, the Examiner is invited to contact Applicants' undersigned attorney at the number indicated below.

To the extent necessary, Applicants petition for an extension of time under 37 CFR 1.136. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to the Antonelli, Terry, Stout & Kraus,

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LLP Deposit Account No. 01-2135 (Docket No. 500.40530X00), and please credit any excess fees to such Deposit Account.

Respectfully submitted,

ANTONELLI, TERRY, STOUT & KRAUS, LLP

By

A handwritten signature in black ink, appearing to read 'G. Montone', written over a horizontal line.

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